Exercise - I (Conceptual Questions) Build Up Your Understanding

SEMICONDUCTORS

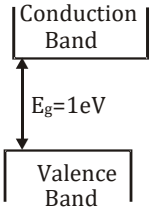
1. On increasing the temperature the specific resistance of a semiconductor :–
(1) increases
(2) decreases
(3) does not change
(4) first decreases and then increases

2. Platinum and silicon are cooled after heating up to 25° C then :–
(1) resistance of platinum will increase and that of silicon decreases.
(2) resistance of silicon will increase and that of platinum decreases.
(3) resistance of both will decrease.
(4) resistance of both increases.

3. Electric conduction in a semiconductor takes place due to :–
(1) electrons only
(2) holes only
(3) both electrons and holes
(4) neither electrons nor holes

4. The atomic bonding is same for which of the following pairs :–
(1) Ag and Si (2) Ge and Si
(2) Ne and Ge (4) NaCl and Ge

5. Which of the following energy band diagram shows the n-type semiconductor :–

(1)


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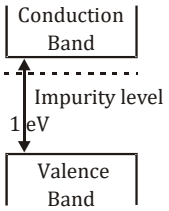

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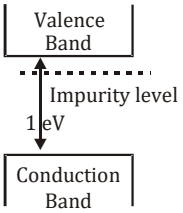

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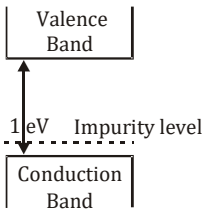

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6. Let n_p and n_e be the numbers of holes and conduction electrons in an extrinsic semiconductor.
(1) $n_p > n_e$ (2) $n_p = n_e$
(3) $n_p < n_e$ (4) $n_p \neq n_e$

7. A p-type semiconductor is :–
(1) positively charged
(2) negatively charged
(3) uncharged
(4) uncharged at 0K but charged at higher temperatures

8. Which statement is correct for p-type semiconductor
(1) the number of electrons in conduction band is more than the number of holes in valence band at room temperature
(2) the number of holes in valence band is more than the number of electrons in conduction band at room temperature
(3) there are no holes and electrons at room temperature
(4) number of holes and electrons is equal in valence and conduction band

9. When an impurity is doped into an intrinsic semiconductor, the conductivity of the semiconductor :
(1) increases (2) decreases
(3) remains the same (4) become zero

10. When we convert pure semiconductor into N type the number of hole :–
(1) Increases (2) Decreases
(3) Remains constant (4) None

11. A semiconductor is damaged by a strong current, because :–
(1) lack of free electrons
(2) decrease in electrons
(3) excess of electrons
(4) none of these

12. If n_e and n_h are the number of electrons and holes in a semiconductor heavily doped with phosphorus, then :–
(1) $n_e >> n_h$ (2) $n_e << n_h$
(3) $n_e \leq n_h$ (4) $n_e = n_h$

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13. Two wires P and Q made up of different materials have same resistance at room temperature. When heated, resistance of P increases and that of Q decreases. We conclude that:–
(1) P and Q both are conductors but because of being made of different materials it happens so.
(2) P is n-type semiconductor and Q is p-type semiconductor.
(3) P is semiconductor and Q is conductor.
(4) P is conductor and Q is semiconductor.

14. When the conductivity of a semiconductor is only due to breaking of covalent bonds, the semiconductor is called :–
(1) intrinsic (2) extrinsic
(3) p-type (4) n-types

15. In an intrinsic semiconductor, number of electrons and holes at room temperature are :-
(1) equal (2) zero
(3) unequal (4) infinity

16. A semiconductor wire is connected in an electric circuit in series and temperature of semiconductor increased then the current in the circuit :–
(1) decreases (2) constant
(3) increases (4) will not flow

17. In germanium crystal, the forbidden energy gap in joule is :–
(1) 1.6×10^{-19} (2) zero
(3) 1.12×10^{-19} (4) 1.76×10^{-19}

18. In semiconductor, at room temperature :–
(1) valence band are partially empty and conduction band are partially filled
(2) valence band are fully filled and conduction band are partially empty
(3) valence band are fully filled
(4) conduction band are fully empty

19. The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature :–
(1) decreases exponentially with increasing band gap.
(2) increases exponentially with increasing band gap.
(3) decrease with increasing temperature.
(4) is independent of the temperature and the band gap.

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20. In a p-type semiconductor, there are mainly :-
(1) free electrons (2) holes
(3) both (1) and (2) (4) none of these

21. A conducting wire of Copper and Germanium are cooled from room temperature to temperature 80K, then their resistance will :–
(1) increase
(2) decrease
(3) copper's increase and Germanium's decrease
(4) copper's decrease and Germanium's increase

22. Choose the false statement from the following :-
(1) the resistivity of a semiconductor increases with increase in temperature.
(2) substances with energy gap of the order of 10 eV are insulators.
(3) in conductors the valence and conduction bands may overlap.
(4) the conductivity of a semiconductor increases with increases in temperature.

23. Carbon, Silicon and Germanium atoms have four valence electrons each. Their valence and conduction bands are separated by energy band gaps represented by $(E_g)_C$, $(E_g)_{Si}$ and $(E_g)_{Ge}$ respectively. Which one of the following relationships is true in their case :–
(1) $(E_g)_C < (E_g)_{Ge}$ (2) $(E_g)_C > (E_g)_{Si}$
(3) $(E_g)_C = (E_g)_{Si}$ (4) $(E_g)_C < (E_g)_{Si}$

24. In semiconducting material the mobilities of electrons and holes are μ_e and μ_h respectively. Which of the following is true :–
(1) $\mu_e > \mu_h$ (2) $\mu_e < \mu_h$
(3) $\mu_e = \mu_h$ (4) $\mu_e < 0; \mu_h > 0$

25. Impurity energy level of n-type semiconductor lies in:-
(1) just above valence band
(2) just below conduction band
(3) between valence and conduction band
(4) none of these

26. What is the energy gap in Si semiconductor?
(1) 4.4 eV (2) 0.3 eV
(3) 0.7 eV (4) 1.1 eV

PN JUNCTION & BIASING OF DIODE

27. Region which have no free electrons and holes in a p-n junction is :–
(1) p - region (2) n - region
(3) junction (4) depletion region

28. In p-n junction at the near at junction there are :-
(1) positive Ions
(2) negative Ions
(3) positive and negative Ions
(4) electrons and holes

29. Depletion layer in p-n junction region is caused by
(1) drift holes
(2) diffusion of free carriers
(3) migration of impurity ions
(4) drift of electrons

30. In a P–N Junction diode not connected to any circuit
(1) potential is the same everywhere.
(2) the P - type side is at a higher potential than the N - type side.
(3) there is an electric field at the junction directed from the N-type side to the P-type side.
(4) there is an electric field at the junction directed from the P-type side to the N-type side.

31. The minority current in a p-n junction is :–
(1) from the n-side to the p-side
(2) from the p-side to the n-side
(3) from the n-side to the p-side if the junction is forward-biased and in the opposite direction if it is reverse biased.
(4) from the p-side to the n-side if the junction is forward-biased and in the opposite direction if it is reverse biased

32. The majority current in a p-n junction is :–
(1) from the n-side to the p-side
(2) from the p-side to the n-side
(3) from the n-side to the p-side if the junction is forward-biased and in the opposite direction if it is reverse biased
(4) from the p-side to the n-side if the junction is forward-biased and in the opposite direction if it is reverse biased

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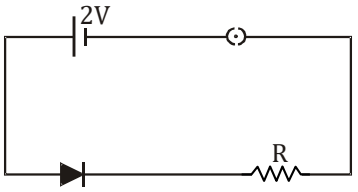
33. Diffusion current in a p-n junction is greater than the drift current in magnitude :–
(1) if the junction is forward-biased
(2) if the junction is reverse-biased
(3) if the junction is unbiased
(4) in no case

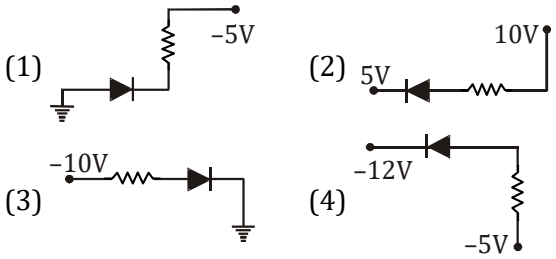
34. In a ..... biased P-N junction, the net flow holes is from N-region to the P-region :–
(1) F.B. (2) R. B.
(3) Unbiased (4) both 1 & 2

35. A 2 V battery forward biases a diode however there is a drop of 0.5 V across the diode which is independent of current. Also a current greater then 10 mA produces large joule loss and damages diode. If diode is to be operated at 5 mA, the series resistance to be put is :–

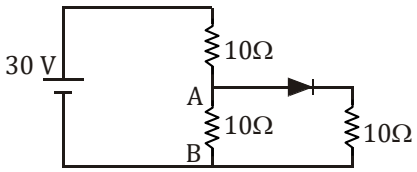


(1) 3 kΩ (2) 300 kΩ
(3) 300 Ω (4) 200 kΩ

36. Which of the following diode is reverse biased:-

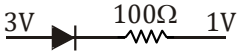


37. Find V_{AB} :–



(1) 10 V (2) 20 V (3) 30 V (4) none

38. Assuming that the junction diode is ideal then the current through the diode is:-



(1) 200 mA (2) 20 mA (3) 2 mA (4) zero

39. The resistance of a reverse biased pn junction diode is about :–
(1) 1 ohm (2) 10^2 ohm
(3) 10^3 ohm (4) 10^6 ohm

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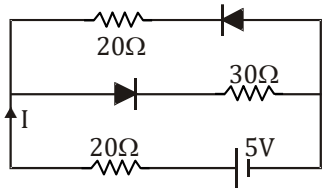
40. Current I in the circuit will be :–



(1) $\frac{5}{40}$ A (2) $\frac{5}{50}$ A

(3) $\frac{5}{10}$ A (4) $\frac{5}{20}$ A

41. In a p-n junction the depletion layer of thickness 10^{-6} m has potential across it is 0.1 V. The average electric field is (V/m) :–

(1) 10^{7} (2) 10^{-6} (3) 10^{5} (4) 10^{-5}

42. In a unbias p-n junction :-

(1) high potential is at n side and low potential is at p side.

(2) high potential is at p side and low potential is at n side.

(3) p and n both are at same potential.

(4) undetermined.

43. On increasing the reverse bias to a large value in p-n junction diode then value of current

(1) remains fixed

(2) increases slowly

(3) decrease slowly

(4) suddenly increase

44. Reverse bias applied to a junction diode :–

(1) lowers the potential barrier.

(2) raises the potential barrier.

(3) increases the majority carrier current.

(4) increases the minority carrier current.

45. Correct statement for diode is :–

(1) in full wave rectifier both diodes work alternatively.

(2) in full wave rectifier both diodes work simultaneously.

(3) efficiency of full wave rectifier and half wave rectifier is same.

(4) full wave rectifier in bidirectional.

46. When a junction diode is reverse biased, the flow of current across the junction is mainly due to :–

(1) diffusion of charges

(2) depends upon the nature of material

(3) drift of charges

(4) both drift and diffusion of charges

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47. The width of depletion region in a p-n junction diode

(1) increases when reverse bias is applied.

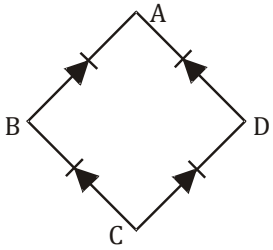
(2) increases when a forward bias is applied.

(3) decreases when a reverse bias is applied.

(4) remains the same irrespective of the bias voltage.

SPECIAL TYPES OF DIODES

48. For the given circuit shown in fig, to act as full wave rectifier :– a.c. input should be connected across ..... and ..... the d.c. output would appear across ..... and .....



(1) A, C, B, D (2) B, D, A, C

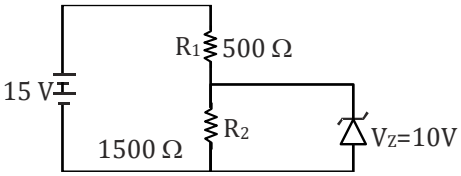
(3) A, B, C, D (4) C, A, D, B

49. Forbidden energy gap of Ge is 0.75 eV, maximum wave length of incident radiation of photon for producing electron - hole pair in germanium semiconductor is :–

(1) 4200 Å (2) 16500 Å

(3) 4700 Å (4) 4000 Å

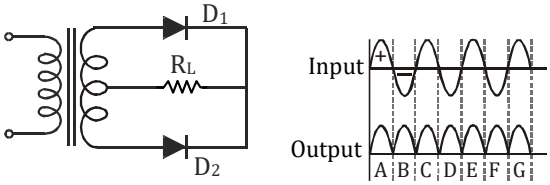
50. In the circuit given the current through the zener diode is :-



(1) 10 mA (2) 6.67 mA

(3) 5 mA (4) 3.33 mA

51. A full wave rectifier circuit along with the input and output voltage is shown in the figure then output due to diode D_2 is :–



(1) A, C (2) B, D

(3) B, C (4) A, D

52. If a full wave rectifier circuit is operating from 50 Hz mains, the fundamental frequency in the ripple will be :–
(1) 25 Hz (2) 50 Hz
(3) 70.7 Hz (4) 100 Hz

53. The electrical circuit used to get smooth DC output from a rectifier circuit is called :–
(1) filter (2) oscillator
(3) logic gate (4) amplifier

54. In p-n junction photocell electromotive force due to monochromatic light is proportional to
(1) p-n potential barrier
(2) intensity of light
(3) frequency of light
(4) p-n applied voltage

55. Efficiency of a half wave rectifier is nearly :–
(1) 80 % (2) 60 % (3) 40 % (4) 20 %

56. Zener dode is used for :–
(1) rectification
(2) stabilization
(3) amplification
(4) producing oscillations in an oscillator

TRANSISTOR

57. A transistor is used in the common emitter mode as an amplifier then :–
(A) the base emitter junction is forward baised.
(B) the base emitter junction is reverse baised.
(C) the input signal is connected in series with the voltage applied to bias the base emitter junction.
(D) the input signal is connected in series with the voltage applied to bias the base collector junction.
(1) A, B (2) A, D
(3) A, C (4) only C

58. In a transistor :–
(1) the emitter has the least concentration of impurity.
(2) the collector has the least concentration of impurity.
(3) the base has the least concentration of impurity.
(4) all the three regions have equal concentration of impurity.

59. In transistor symbols, the arrows shows the direction of :-
(1) current in the emitter
(2) electron current in the emitter
(3) holes current in the collector
(4) electron current in the collector

60. The region of transistor in which extra impurity is doped to obtain a large number of majority carrier is called as :–
(1) emitter
(2) base
(3) collector
(4) any one of these depending upon the transistor

61. An oscillator is nothing but an amplifier with :–
(1) positive feedback
(2) high gain
(3) no feedback
(4) negative feedback

62. Input resistance of common emitter transistor compare with output resistance is :–
(1) less (2) more
(3) less and more (4) none of these

63. The current gain β of a transistor is 50. The input resistance of the transistor, when used in the common emitter configuration, is 1 kΩ. The peak value of the collector a.c. current for an alternating peak input voltage 0.01 V is :–
(1) 100 μA (2) 250 μA
(3) 500 μA (4) 800 μA

64. A transistor is operated in CE configuration at V_{CC} = 2 V such that a change in base current from 100 μA to 200 μA produces a change in the collector current from 9 mA to 16.5 mA. The value of current gain, β is :–
(1) 45 (2) 50 (3) 60 (4) 75

65. The input resistance of a silicon transistor is 1 kΩ. If base current is changed by 100 μA, it causes the change in collector current by 2 mA. This transistor is used as a CE amplifier with a load resistance of 5 kΩ. What is the ac voltage gain of amplifier ?
(1) 10 (2) 100 (3) 500 (4) 200

66. For a transistor amplifier power gain and voltage gain are 7.5 and 2.5 respectively. The value of the current gain will be :–
(1) 0.33 (2) 0.66 (3) 0.99 (4) 3

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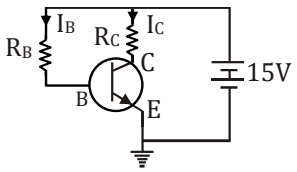
67. In the following common emitter circuit if $\beta = 100$, $V_{CE} = 7$ V, V_{BE} = negligible, $R_C = 2$ kΩ then I_B is :-



(1) 0.01 mA (2) 0.04 mA
(3) 0.02 mA (4) 0.03 mA

68. When a transistor is used in a circuit :
(1) both junctions are forward biased.
(2) emitter base junction is forward biased and the base collector junction is reverse biased.
(3) emitter base junction is reverse biased and the base collector junction is forward biased.
(4) both junctions are reverse biased.

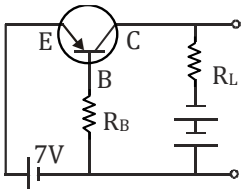
69. What is the voltage gain in a common emitter amplifier where input resistance is 3 Ω and load resistance is 24 Ω and current gain $\beta = 6$?
(1) 2.2 (2) 1.2 (3) 4.8 (4) 48

70. In a n-p-n transistor circuit, the collector current is 10 mA. If 90% of the electrons emitted reach the collector then the emitter current (I_E) and base current (I_B) are given by :–
(1) $I_E = 1$ mA; $I_B = 11$ mA
(2) $I_E = 11$ mA ; $I_B = 1$ mA
(3) $I_E = -1$ mA; $I_B = 9$ mA
(4) $I_E = 9$ mA ; $I_B = -1$ mA

71. In a transistor, the base is made very thin and lightly doped with an impurity :–
(1) to save the transistor from heating effect
(2) to enable the emitter to emit small number of electrons and holes
(3) to enable the collector to collect 95% of the holes or electron coming from the emitter side
(4) none of the above

72. In CB configuration of transistor ac current gain is $\frac{\Delta i_C}{\Delta i_E} = 0.98$, determine current gain of CE configuration :–
(1) 49 (2) 98
(3) 4.9 (4) 24.5

73. In the given transistor circuit, the base current is 35 μA. The value of R_B is (V_{BE} is assumed to negligible)



(1) 100 kΩ (2) 300 kΩ
(3) 200 kΩ (4) 400 kΩ

74. In an n-p-n transistor :–
(1) holes move from emitter to base
(2) electrons moves from emitter to base
(3) holes move from base to collector
(4) electrons move from collector to base

75. In the study of transistor as amplifier if $\alpha = \frac{I_C}{I_E}$ and $\beta = \frac{I_C}{I_B}$ where I_C, I_B, and I_E are the collector, base and emitter current, then :–

(1) $\beta = \frac{\alpha}{1+\alpha}$ (2) $\beta = \frac{\alpha}{1-\alpha}$
(3) $\beta = \frac{1+\alpha}{\alpha}$ (4) $\beta = \frac{1-\alpha}{\alpha}$

76. In the CB mode of a transistor, when the collector voltage is changed by 0.5 volt, the collector current changes by 0.05 mA. the output resistance will be
(1) 10 kΩ (2) 20 kΩ
(3) 5 kΩ (4) 2.5 kΩ

77. A n-p-n transistor conducts when :–
(1) both collector and emitter are positive with respect to the base.
(2) collector is positive and emitter is negative with respect to the base.
(3) collector is positive and emitter is at same potential as the base.
(4) both collector and emitter are negative with respect to the base.

78. In the case of constants α and β of a transistor :–
(1) $\alpha = \beta$ (2) $\beta < 1$ $\alpha > 1$
(3) $\alpha\beta = 1$ (4) $\beta > 1$ $\alpha < 1$

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79. For a transistor in a common emitter arrangement the alternating current gain β is given by :–

(1) $\beta = \left[\frac{\Delta I_C}{\Delta I_E}\right]_{V_{CE}}$ (2) $\beta = \left[\frac{\Delta I_B}{\Delta I_C}\right]_{V_{CE}}$

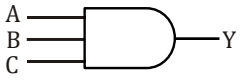
(3) $\beta = \left[\frac{\Delta I_C}{\Delta I_B}\right]_{V_{CE}}$ (4) $\beta = \left[\frac{\Delta I_E}{\Delta I_C}\right]_{V_{CE}}$

80. Consider an n–p–n transistor amplifier in common–emitter configuration. The current gain of the transistor is 100. If the collector current changes by 1 mA, what will be the change in emitter current ?

(1) 1·1 mA (2) 1·01 mA
(3) 0·01 mA (4) 10 mA

LOGIC GATE

81. The output of the given logic gate is 1 when inputs A, B and C are such that :–



(1) A = 1, B = 0, C = 1 (2) A = 1, B = 1, C = 0
(3) A = B = C = 0 (4) A = B = C = 1

82. A two inputed XOR gate produces an high output only when its both inputs are :–

(1) same (2) different
(3) low (4) high

83. Which of the following Boolean expression is not correct :–

(1) $\overline{\bar{A}.\bar{B}} = A + B$ (2) $\overline{\bar{A}+\bar{B}} = A \,.\, B$

(3) $\overline{\overline{A.B}} = A.B$ (4) $\bar{1}+\bar{1}=1$

84. In Boolean algebra, which of the following is not equal to zero :–

(1) $A.\bar{A}$ (2) A.0 (3) $\overline{A+\bar{A}}$ (4) $\overline{\bar{A}.0}$

85. Digital circuits can be made by respectative use of :–

(1) OR gate (2) AND gate
(3) NOT gate (4) NAND gate

86. The truth table shown below is for which of the following gates :–

A	B	Y
1	1	1
0	1	0
1	0	0
0	0	1

(1) XNOR (2) AND
(3) XOR (4) NOR

87. When all the inputs of a NAND gate are connected together, the resulting circuit is :–

(1) a NOT gate (2) an AND gate
(3) an OR gate (4) a NOR gate

88. A NAND gate followed by a NOT gate is :–

(1) an OR gate (2) an AND gate
(3) a NOR gate (4) a XOR gate

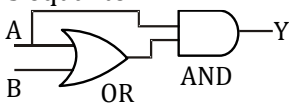
89. The NOR gate is logically equivalent to an OR gate followed by :–

(1) an inverter (2) a NOR gate
(3) a NAND gate (4) All of above

90. The output of a two input NOR gate is in state 1 when :–

(1) either input terminals is at 0 state
(2) either input terminals is at 1 state
(3) both input terminals are at 0 state
(4) both input terminals are at 1 state

91. The output Y of the combination of gates shown is equal to :–

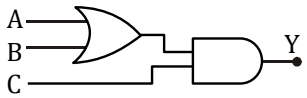


(1) A (2) $\bar{A}$ (3) A + B (4) AB

92. What would be the output of the circuit whose Boolean expression $Y = A\bar{B} + AB$ when A = 1, B = 0 :–

(1) 1 (2) 0
(3) both (1) & (2) (4) none of these

93. To get an output 1, the input ABC should be :–

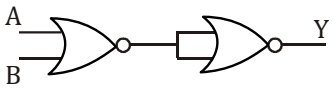


(1) 101 (2) 100 (3) 110 (4) 010

94. The output of 2 input gate is 1 only if its inputs are equal. It is true for :–

(1) NAND (2) AND
(3) EX-NOR (4) EX-OR

95. The circuit shown here is logically equivalent to:–



(1) OR gate (2) AND gate
(3) NOT gate (4) NAND gate

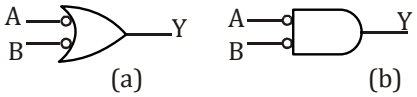
96. A two-input NAND gate is followed by a single-input NOR gate. This logic circuit will function as :–

(1) an AND gate (2) an OR gate
(3) a NOT gate (4) a NOR gate

TG: @Chalnaayaaar

TG: @Chalnaayaaar

97. The logic symbols shown here are logically equivalent to :–



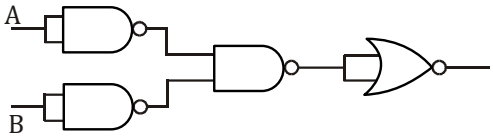
(1) (a) AND and (b) OR gate

(2) (a) NOR and (b) NAND gate

(3) (a) OR and (b) AND gate

(4) (a) NAND and (b) NOR gate

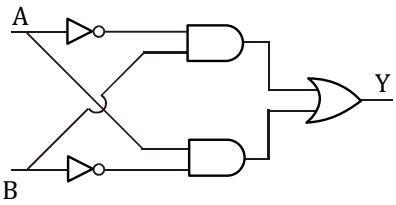
98. The combination of the gates shown will produce



(1) OR gate (2) AND gate

(3) NOR gate (4) NAND gate

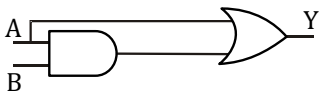
99. The combination of the gates shown will produce



(1) AND gate (2) NAND gate

(3) NOR gate (4) XOR gate

100. The truth table for the following combination of gates is :-



(1)

A	B	Y
0	0	0
0	1	0
1	0	1
1	1	1

(2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(3)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(4)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

101. In the Boolean algebra $\bar{A}.\bar{B}$ equals :–

(1) A + B (2) $\overline{A+B}$

(3) A . B (4) $\bar{A}.B$

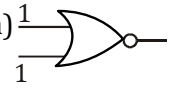
102. How many NOR gates are required to form NAND gate :–

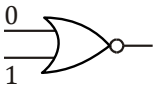
(1) 1 (2) 3 (3) 2 (4) 4

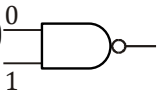
103. How many NAND gates are used to form AND gate :–

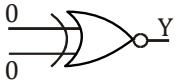
(1) 3 (2) 2 (3) 1 (4) 4

104. Which of the following gates will have an output of 1 :–

(a) 

(b) 

(c) 

(d) 

(1) (a) and (b) (2) (b) and (c)

(3) (c) and (d) (4) (a) and (d)

105. The logic behind 'NOR' gate is that it gives :–

(1) high output when both inputs are high

(2) high output when both inputs are low

(3) low output when both inputs are low

(4) none of these

106. Logic gates are the building blocks of a :–

(1) abacus system (2) analog system

(3) digital system (4) none of these

107. Boolean algebra is essentially based on :–

(1) logic (2) truth

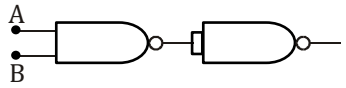
(3) numbers (4) symbol

108. Out of the following, universal gate is :–

(1) NOT (2) OR

(3) AND (4) NAND

109. Identify the logic operation of the following logic circuit



(1) NAND (2) AND

(3) NOR (4) OR

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EXERCISE-I (Conceptual Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	2	3	2	2	4	3	2	1	2	3	1	4	1	1
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	3	3	1	1	2	4	1	2	1	2	4	4	3	2	3
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	1	2	1	2	3	3	1	2	4	2	3	1	4	2	1
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	3	1	2	2	4	2	4	1	2	3	2	3	3	1	1
Question	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Answer	1	1	3	4	2	4	2	2	4	2	3	1	3	2	2
Question	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Answer	1	2	4	3	2	4	2	4	4	4	1	1	2	4	3
Question	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Answer	1	1	1	3	1	1	4	3	4	1	2	4	2	3	2
Question	106	107	108	109											
Answer	3	1	4	2											

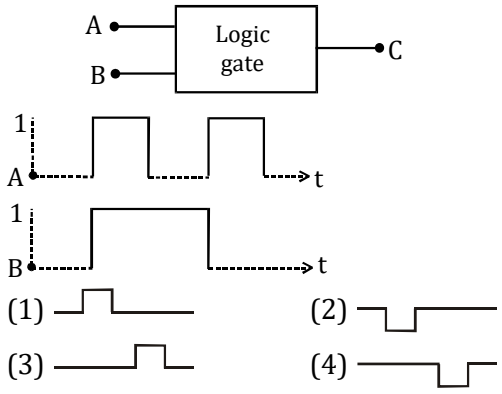
Exercise - II (Previous Year Questions) AIPMT/NEET

AIPMT 2006

1. A transistor-oscillator using a resonant circuit with an inductor L (of negligible resistance) and a capacitor C in series produce oscillations of frequency f. If L is doubled and C is changed to 4C, the frequency will be :-

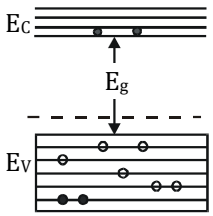
(1) $\frac{f}{4}$ (2) 8 f (3) $\frac{f}{2\sqrt{2}}$ (4) $\frac{f}{2}$

2. The following figure shows a AND logic gate circuit with two inputs A and B and the output C. The voltage waveforms of C will be -



AIPMT 2007

3. In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is:-

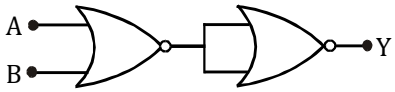


(1) an n-type semiconductor
(2) a p-type semiconductor
(3) an insulator
(4) a metal

4. A common emitter amplifier has a voltage gain of 50, an input impedance of 100 Ω and an output impedance of 200 Ω. The power gain of the amplifier is :-

(1) 100 (2) 500
(3) 1000 (4) 1250

5. In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table :-



(1)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(3)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(4)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

AIPMT 2008

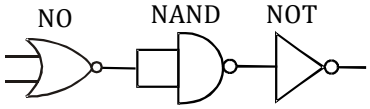
6. A p–n photodiode is made of a material with a band gap of 2.0 eV. The minimum frequency of the radiation that can be absorbed by the material is nearly :-

(1) 1×10^{14} Hz (2) 20×10^{14} Hz
(3) 10×10^{14} Hz (4) 5×10^{14} Hz

7. The voltage gain of an amplifier with 9% negative feedback is 10. The voltage gain without feedback will be :-

(1) 1.25 (2) 100 (3) 90 (4) 10

8. The circuit



is equivalent to:-

(1) NOR gate (2) OR gate
(3) AND gate (4) NAND gate

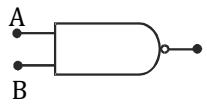
AIPMT 2009

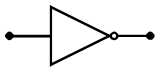
9. A p-n photodiode is fabricated from a semiconductor with a band gap of 2.5 eV. It can detect a signal of wavelength :-

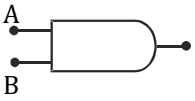
(1) 4000 Å (2) 6000 Å
(3) 4000 nm (4) 6000 nm

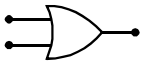
TG: @Chalnaayaaar

10. The symbolic representation of four logic gates are given below :

(i) 

(ii) 

(iii) 

(iv) 

The logic symbols for OR, NOT and NAND gates are respectively :-

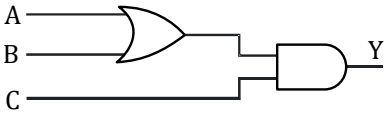
(1) (i), (iii), (iv) (2) (iii), (iv), (ii)
(3) (iv), (i), (iii) (4) (iv), (ii), (i)

AIPMT 2010

11. The device that can act as a complete electronic circuit is :
(1) Zener diode
(2) Junctions diode
(3) Integrated circuit
(4) Junction transistor

12. Which one of the following statement is false ?
(1) The resistance of intrinsic semiconductor decreases with increase of temperature.
(2) Pure Si doped with trivalent impurities gives a p-type semiconductor.
(3) Majority carriers in a n-type semiconductor are holes.
(4) Minority carriers in a p-type semiconductor are electrons.

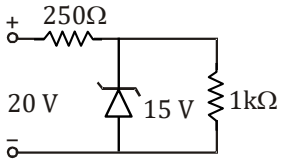
13. To get an output Y = 1 in given circuit which of the following input will be correct:



	A	B	C
(1)	1	1	0
(2)	0	1	0
(3)	1	0	0
(4)	1	0	1

AIPMT 2011

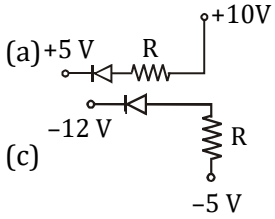
14. A zener diode, having breakdown voltage equal to 15 V, is used in a voltage regulator circuit shown in figure. The current through the zener diode is :-

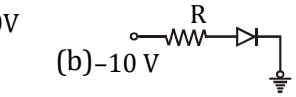


(1) 5 mA (2) 10 mA
(3) 15 mA (4) 20 mA

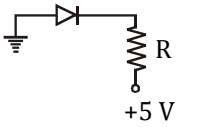
TG: @Chalnaayaaar

15. In the following figure, the diodes which are forward biased, are :-

(a) 

(b) 

(c)

(d) 

(1) (a), (b) and (d) (2) (c) only
(3) (a) and (c) (4) (b) and (d)

16. Pure Si at 500 K has equal number of electron (n_e) and hole (n_h) concentrations to 1.5×10^{16} m^{-3}. Doping by indium increases n_h to 4.5×10^{22} m^{-3}. The doped semiconductor is of :-
(1) p-type having electron concentrations $n_e = 5 \times 10^9$ m^{-3}
(2) n-type with electron concentration $n_e = 5 \times 10^{22}$ m^{-3}
(3) P-type with electron concentration $n_e = 2.5 \times 10^{10}$ m^{-3}
(4) n-type with electron concentration $n_e = 2.5 \times 10^{23}$ m^{-3}

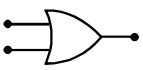
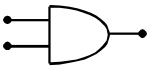
17. A transistor is operated in common emitter configuration at $V_C = 2$ V such that a change in the base current from 100 μA to 300 μA produces a change in the collector current from 10 mA to 20 mA. The current gain is :-
(1) 50 (2) 75 (3) 100 (4) 25

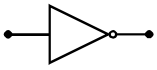
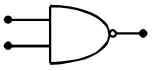
18. In forward biasing of the p–n junction :-
(1) The positive terminal of the battery is connected to p–side and the depletion region becomes thick.
(2) The positive terminal of the battery is connected to n-side and the depletion region becomes thin.
(3) The positive terminal of the battery is connected to n-side and the depletion region becomes thick.
(4) The positive terminal of the battery is connected to p-side and the depletion region becomes thin.

19. If a small amount of antimony is added to germanium crystal :
(1) it becomes a p-type semiconductor
(2) the antimony becomes an acceptor atom
(3) there will be more free electrons than holes in the semiconductor
(4) its resistance is increased

TG: @Chalnaayaadar

20. Symbolic representation of four logic gates are shown as :-

(i)  (ii) 

(iii)  (iv) 

Pick out which ones are for AND, NAND and NOT gates, respectively :-

(1) (ii), (iii) and (iv) (2) (iii), (ii) and (i)

(3) (iii), (ii) and (iv) (4) (ii), (iv) and (iii)

AIPMT 2012

21. In a CE transistor amplifier, the audio signal voltage across the collector resistance of 2 kΩ is 2 V. If the base resistance is 1kΩ and the current amplification of the transistor is 100, the input signal voltage is:-

(1) 1 mV (2) 10 mV (3) 0.1 V (4) 1.0 V

22. C and Si both have same lattice structure, having 4 bonding electrons in each. However, C is insulator where as Si is intrinsic semiconductor. This is because :

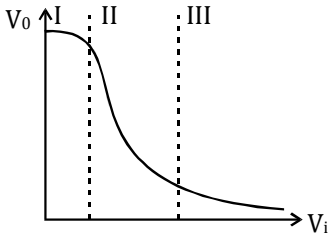
(1) The four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si they lie in the third.

(2) The four bonding electrons in the case of C lie in the third orbit, whereas for Si they lie in the fourth orbit.

(3) In case of C the valence band is not completely filled at absolute zero temperature.

(4) In case of C the conduction band is partly filled even at absolute zero temperature

23. Transfer characteristics [(output voltage (V_0) vs input voltage (V_i)] for a base biased transistor in CE configuration is as shown in the figure. For using transistor as a switch, it is used.



(1) in region II

(2) in region I

(3) in region III

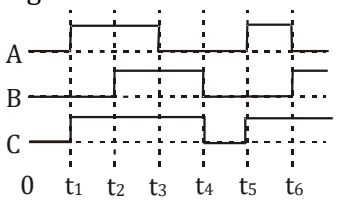
(4) both in region (I) & (III)

24. The input resistance of a silicon transistor is 100 Ω. Base current is changed by 40 μA which results in a change in collector current by 2 mA. This transistor is used as a common emitter amplifier with a load resistance of 4 kΩ. The voltage gain of the amplifier is :

(1) 4000 (2) 1000

(3) 2000 (4) 3000

25. The figure shown a logic circuit two inputs A and B and the output C. The voltage wave forms across A, B and C are as given. The logic circuit gate is:



(1) AND gate (2) NAND gate

(3) OR gate (4) NOR gate

NEET-UG 2013

26. In a common emitter (CE) amplifier having a voltage gain G, the transistor used has transconductance 0.03 mho and current gain 25. If the above transistor is replaced with another one with transconductance 0.02 mho and current gain 20, the voltage gain will be :

(1) $\frac{5}{4}$G (2) $\frac{2}{3}$G (3) 1.5 G (4) $\frac{1}{3}$G

27. In a n-type semiconductor, which of the following statement is true:

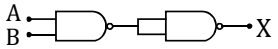
(1) Holes are majority carriers and trivalent atoms are dopants.

(2) Electrons are majority carriers and trivalent atoms are dopants.

(3) Electron are minority carriers and pentavalent atoms are dopants.

(4) Holes are minority carriers and pentavalent atoms are dopants.

28. The output (X) of the logic circuit shown in figure will be :



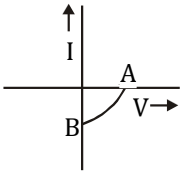
(1) $X = \overline{A + B}$ (2) $X = \overline{\overline{A}.\overline{B}}$

(3) $X = \overline{A.B}$ (4) X = A.B

TG: @Chalnaayaadar

AIPMT 2014

29. The given graph represents V-I characteristic for a semiconductor device.



Which of the following statement is **correct** ?

(1) It is V - I characteristic for solar cell where, point A represents open circuit voltage and point B short circuit current.

(2) It is a for a solar cell and point A and B represent open circuit voltage and current, respectively.

(3) It is for a photodiode and points A and B represent open circuit voltage and current, respectively.

(4) It is for a LED and points A and B represent open circuit voltage and short circuit current, respectively.

30. The barrier potential of a p-n junction depends on:

(a) type of semiconductor material

(b) amount of doping

(c) temperature

Which one of the following is correct ?

(1) (a) and (b) only

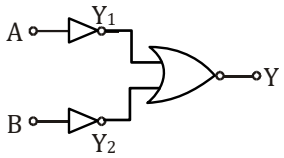
(2) (b) only

(3) (b) and (c) only

(4) (a), (b) and (c)

AIPMT-2015

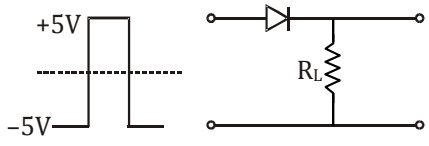
31. Which logic gate is represented by the following combination of logic gates ?



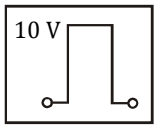
(1) NAND (2) AND

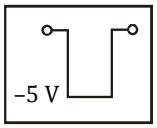
(3) NOR (4) OR

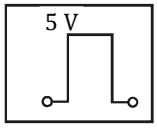
32. If in a p-n junction, a square input signal of 10 V is applied as shown,

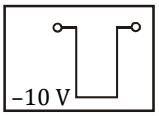


then the output across R_L will be :

(1) 

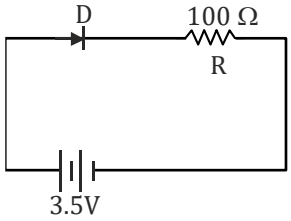
(2) 

(3) 

(4) 

RE–AIPMT-2015

33. In the given figure, a diode D is connected to an external resistance R =100 Ω and an e.m.f of 3.5 V. If the barrier potential developed across the diode is 0.5 V, the current in the circuit will be :



(1) 35 mA (2) 30 mA

(3) 40 mA (4) 20 mA

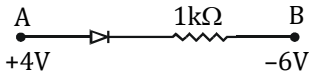
34. The input signal given to a CE amplifier having a voltage gain of 150 is $V_i = 2\cos\left(15t+\frac{\pi}{3}\right)$. The corresponding output signal will be -

(1) $300\cos\left(15t+\frac{4\pi}{3}\right)$ (2) $300\cos\left(15t+\frac{\pi}{3}\right)$

(3) $75\cos\left(15t+\frac{2\pi}{3}\right)$ (4) $2\cos\left(15t+\frac{5\pi}{6}\right)$

NEET-I 2016

35. Consider the junction diode as ideal. The value of current flowing through AB is :



(1) 0 A (2) 10^{-2} A (3) 10^{-1} A (4) 10^{-3} A

36. A npn transistor is connected in common emitter configuration in a given amplifier. A load resistance of 800 Ω is connected in the collector circuit and the voltage drop across it is 0.8 V. If the current amplification factor is 0.96 and the input resistance of the circuit is 192Ω, the voltage gain and the power gain of the amplifier will respectively be :

(1) 4, 3.84 (2) 3.69, 3.84

(3) 4, 4 (4) 4, 3.69

TG: @Chalnaayaaar

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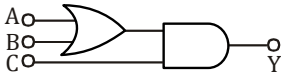
37. To get output 1 for the following circuit, the correct choice for the input is



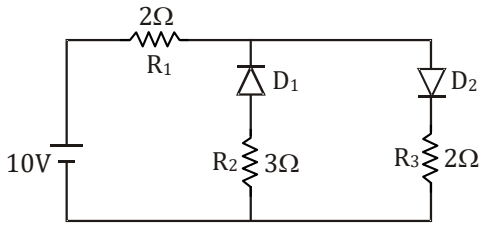
(1) A = 0, B = 1, C = 0
(2) A = 1, B = 0, C = 0
(3) A = 1, B = 1, C = 0
(4) A = 1, B = 0, C = 1

NEET-II 2016

38. For CE transistor amplifier, the audio signal voltage across the collector resistance of 2 kΩ is 4 V. If the current amplification factor of the transistor is 100 and the base resistance is 1 kΩ, then the input signal voltage is :-

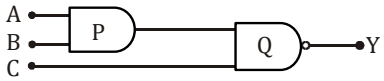
(1) 30 mV (2) 15 mV
(3) 10 mV (4) 20 mV

39. The given circuit has two ideal diodes connected as shown in the figure below. The current flowing through the resistance R_1 will be :-



(1) 1.43 A (2) 3.13 A
(3) 2.5 A (4) 10.0 A

40. What is the output Y in the following circuit, when all the three inputs A, B, C are first 0 and then 1 ?



(1) 1,0 (2) 1,1 (3) 0,1 (4) 0.0

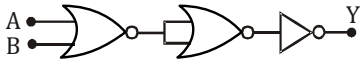
NEET(UG) 2017

41. In a common emitter transistor amplifier the audio signal voltage across the collector is 3V. The resistance of collector is 3 kΩ. If current gain is 100 and the base resistance is 2 kΩ, the voltage and power gain of the amplifier is :-

(1) 15 and 200 (2) 150 and 15000
(3) 20 and 2000 (4) 200 and 1000

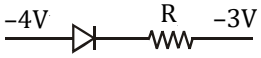
TG: @Chalnaayaaar

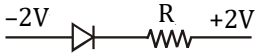
42. The given electrical network is equivalent to :

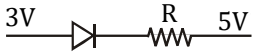


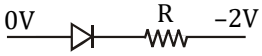
(1) OR gate (2) NOR gate
(3) NOT gate (4) AND gate

43. Which one of the following represents forward bias diode ?

(1) 

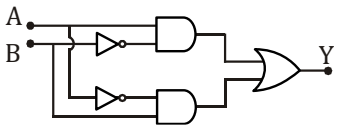
(2) 

(3) 

(4) 

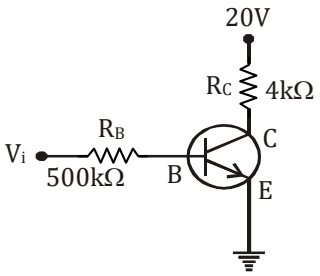
NEET(UG) 2018

44. In the combination of the following gates the output Y can be written in terms of inputs A and B as :-



(1) $\overline{A \cdot B}$ (2) $A \cdot \bar{B} + \bar{A} \cdot B$
(3) $\overline{A \cdot B} + A.B$ (4) $\overline{A + B}$

45. In the circuit shown in the figure, the input voltage V_i is 20 V, V_{BE} = 0 and V_{CE} = 0. The values of I_B, I_C and β are given by :-



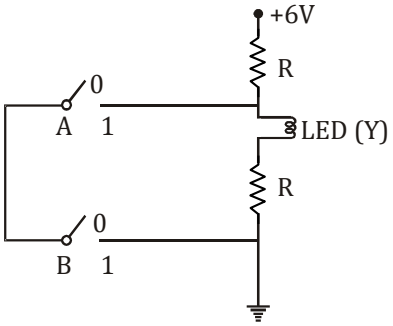
(1) I_B = 40 μA, I_C = 10 mA, β = 250
(2) I_B = 25 μA, I_C = 5 mA, β = 200
(3) I_B = 20 μA, I_C = 5 mA, β = 250
(4) I_B = 40 μA, I_C = 5 mA, β = 125

46. In a p-n junction diode, change in temperature due to heating :-

(1) affects only reverse resistance
(2) affects only forward resistance
(3) does not affect resistance of p-n junction
(4) affects the overall V – I characteristics of p-n junction

NEET(UG) 2019

47.



The correct Boolean operation represented by the circuit diagram drawn is :

(1) AND (2) OR (3) NAND (4) NOR

48. For a p-type semiconductor which of the following statements is **true** ?

(1) Electrons are the majority carriers and trivalent atoms are the dopants.

(2) Holes are the majority carriers and trivalent atoms are the dopants.

(3) Holes are the majority carriers and pentavalent atoms are the dopants.

(4) Electrons are the majority carriers and pentavalent atoms are the dopants.

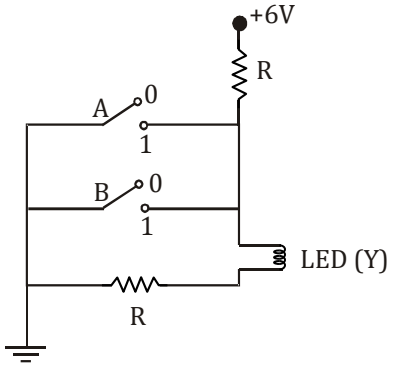
NEET(UG) 2019 (Odisha)

49. An LED is constructed from a p-n junction diode using GaAsP. The energy gap is 1.9 eV. The wavelength of the light emitted will be equal to :-

(1) 10.4×10^{-26} m (2) 654 nm

(3) 654 Å (4) 654×10^{-11} m

50. The circuit diagram shown here corresponds to. the logic gate,



(1) NOR (2) AND

(3) OR (4) NAND

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NEET(UG) 2020

51. For transistor action, which of the following statements is **correct**?

(1) The base region must be very thin and lightly doped.

(2) Base, emitter and collector regions should have same doping concentrations.

(3) Base, emitter and collector regions should have same size.

(4) Both emitter junction as well as the collector junction are forward biased.

52. The increase in the width of depletion region in a p-n junction diode is due to :

(1) increase in forward current

(2) forward bias only

(3) reverse bias only

(4) both forward bias and reverse bias

53. The solids which have the negative temperature coefficient of resistance are :

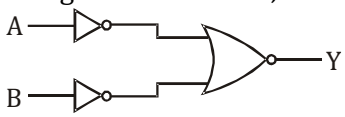
(1) insulators and semiconductors

(2) metals

(3) insulators only

(4) semiconductors only

54. For the logic circuit shown, the truth table is :



(1)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(3)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

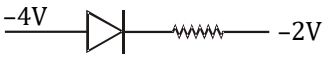
(4)

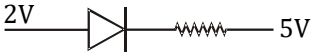
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

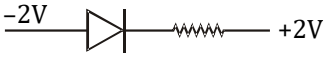
TG: @Chalnaayaaar

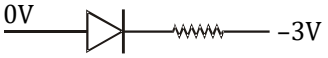
NEET(UG) 2020 (COVID-19)

55. Out of the following which one is a forward biased diode ?

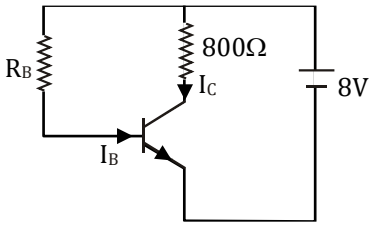
(1) 

(2) 

(3) 

(4) 

56. A n-p-n transistor is connected in common emitter configuration (see figure) in which collector voltage drop across load resistance (800 Ω) connected to the collector circuit is 0.8 V. The collector current is :



(1) 2mA (2) 0.1mA (3) 1mA (4) 0.2mA

57. Which of the following gate is called universal gate?

(1) OR gate (2) AND gate
(3) NAND gate (4) NOT gate

58. An intrinsic semiconductor is converted into n-type extrinsic semiconductor by doping it with :-

(1) Phosphorous (2) Aluminium
(3) Silver (4) Germanium

NEET(UG) 2021

59. The electron concentration in an n-type semiconductor is the same as hole concentration in a p-type semiconductor. An external field (electric) is applied across each of them. Compare the currents in them.

(1) current in n-type = current in p-type
(2) current in p-type > current in n-type
(3) current in n-type > current in p-type
(4) No current will flow in p-type, current will only flow in n-type

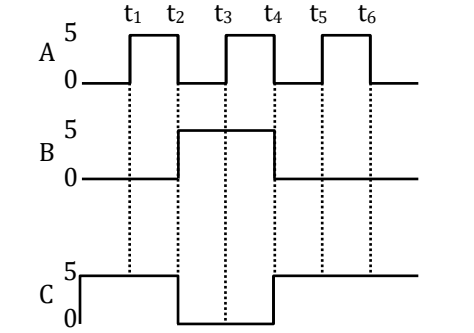
60. Consider the following **statements (A)** and **(B)** and identify the **correct** answer.

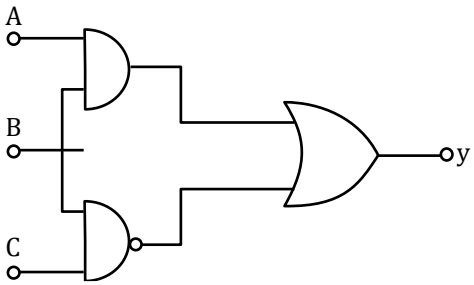
(A) A zener diode is connected in reverse bias, when used as a voltage regulator.

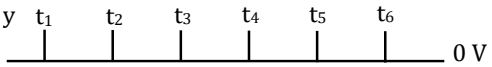
(B) The potential barrier of p-n junction lies between 0.1 V to 0.3 V.

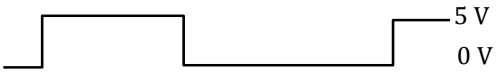
(1) **(A)** and **(B)** both are correct.
(2) **(A)** and **(B)** both are incorrect.
(3) **(A)** is correct and **(B)** is incorrect.
(4) **(A)** is incorrect but **(B)** is correct.

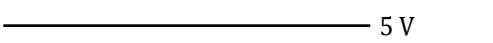
61. For the given circuit, the input digital signals are applied at the terminals A, B and C. What would be the output at the terminal y ?

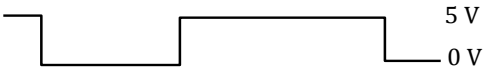




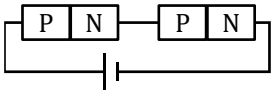
(1) 

(2) 

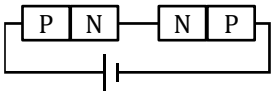
(3) 

(4) 

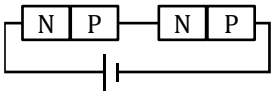
NEET(UG) 2022



(a)

62. 

(b)



(c)

In the given circuits (a), (b) and (c), the potential drop across the two p-n junctions are equal in :

(1) (b) only (2) (c) only
(3) Both (a) and (c) (4) (a) only

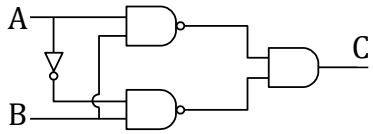
TG: @Chalnaayaaar

63. In half wave rectification, if the input frequency is 60 Hz, then the output frequency would be :

(1) 30 Hz (2) 60 Hz

(3) 120 Hz (4) Zero

64.



The truth table for the given logic circuit is :

(1)

A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

(2)

A	B	C
0	0	1
0	1	0
1	0	1
1	1	0

(3)

A	B	C
0	0	0
0	1	1
1	0	0
1	1	1

(4)

A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

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65. The incorrect statement about the property of a Zener diode is :-

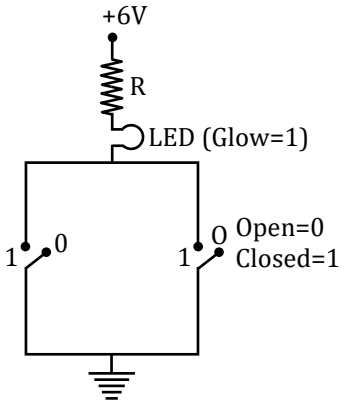
(1) Zener voltage remains constant at breakdown

(2) It is designed to operate under reverse bias

(3) Depletion region formed is very wide

(4) p and n regions of zener diode are heavily doped

66.



Identify the equivalent logic gate represented by the given circuit :

(1) OR (2) NOR

(3) AND (4) NOT

67. The collector current in a common base amplifier using n-p-n transistor is 24 mA. If 80% of the electrons released by the emitter is accepted by the collector, then the base current is numerically:

(1) 6 mA and leaving the base

(2) 3 mA and leaving the base

(3) 6 mA and entering the base

(4) 3 mA and entering the base

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	3	1	2	4	1	4	2	1	1	4	3	3	4	1	3
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	1	1	4	3	4	2	1	4	3	3	2	4	2,4	1	4
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	2	3	2	1	2	1	4	4	3	1	2	2	4	2	4
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	4	3	2	2	1	1	3	1	2	4	3	3	1	3	3
Question	61	62	63	64	65	66	67								
Answer	3	3	2	2	3	1	3								

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Exercise - III (Analytical Questions) Master Your Understanding

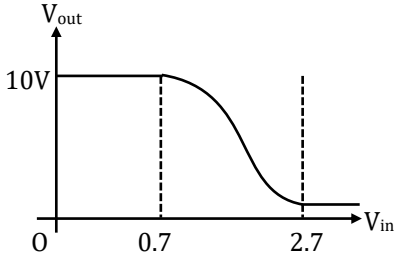
1. Given blow are two statements:
Statement-I : Doping of indium in Si crystal leads to p-type semiconductor.
Statement-II : Indium is a pentavalent atom.
In light of above statement choose the most **appropriate** answer from the options given below:
(1) Both statement I and statement II are correct.
(2) Statement I is correct and statement II is incorrect.
(3) Statement I is incorrect and statement II is correct.
(4) Both statements I and statements II are incorrect.

2. Match the column-I of special diodes with their utilization given in column-II:

Column I	**Column II**
(a) Zener diode	(1) As a light sensor
(b) LED	(2) Voltage regulator circuit
(c) Photodiode	(3) As a bulb of light

(1) a $\rightarrow$ 3, b $\rightarrow$ 2, c $\rightarrow$ 1
(2) a $\rightarrow$ 3, b $\rightarrow$ 1, c $\rightarrow$ 2
(3) a $\rightarrow$ 1, b $\rightarrow$ 3, c $\rightarrow$ 2
(4) a $\rightarrow$ 2, b $\rightarrow$ 3, c $\rightarrow$ 1

3. For a given transfer characteristic curve of common emitter transistor



Which of followings are correct –
(a) At V_{in} = 0.5 V transistor is used as a 'OFF switch'
(b) At V_{in} = 1.5 V transistor is used as a 'ON switch'
(c) At V_{in} = 1.5 V transistor is used as an amplifier
(d) At V_{in} = 3 V transistor is used as a OFF switch'.
(1) a, b, c & d (2) a, b & d
(3) b & d (4) a & c

4. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**
Assertion (A) : The number of electrons in n-type silicon semiconductor is higher than the number of electrons in a pure silicon semiconductor.
Reason (R) : The law of mass action is applicable only to n-type semiconductors.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

5. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**
Assertion (A) : Transistor as an amplifier must be used in active region.
Reason (R) : In active region output voltage approximately linearly change with input voltage.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

6. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**
Assertion (A) : Temperature coefficient of resistance for semiconductor is negative
Reason (R) : Conductivity of semiconductor increases with increment in temperature.
In the light of the above statements, choose the most appropriate answer from the options given below:

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(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

7. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**

Assertion (A) : The OR gate function corresponds to switches in parallel.

Reason (R) : The AND gate function corresponds to switches in series.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

8. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**

Assertion (A) : In an unbiased p–n junction, holes diffuse from the p–region to n–region.

Reason (R) : Hole concentration in p–region is more as compared to n–region.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

EXERCISE-III (Analytical Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8
Answer	2	4	4	3	1	1	2	1

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